

REMARKS

This paper is submitted in reply to the Office Action dated August 3, 2004. A request for a one month extension of time is enclosed herewith, and therefore, the period for response extends up to and includes December 3, 2004. Reconsideration and allowance of all pending claims are respectfully requested.

In the subject Office Action, claims 1-9, 12-13, 23-26, 28-29, 33, and 38-39 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,740,440 to West. In addition, claims 10-11, 14-22, 27, 30-32, 34-37, and 40 were rejected under 35 U.S.C. § 103(a) as being unpatentable over West in view of Applicant's Admission of Prior Art, specifically the passages in the Application at page 2, lines 3-8; and page 3, lines 1-8 and 20-22. In addition, the specification was objected-to for an improper attempt to incorporate subject matter into the Application.

Applicants respectfully traverse the Examiner's rejections to the extent that they are maintained. Applicants have canceled claims 7 and 28 and amended claims 1, 8, 14, 23, 29, 34, 38 and 40. Applicants respectfully submit that no new matter is being added by the above amendments, as the amendments are fully supported in the specification, drawings and claims as originally filed.

Now turning to the subject Office Action, and specifically to the objection to the specification, the Examiner will note that Applicants have amended the specification to add the serial number for the application being incorporated by reference. Withdrawal of the objection to the specification is therefore respectfully requested.

Next, turning to the rejection of independent claim 1, this claim generally recites a computer-implemented method of debugging an object-oriented computer program. The method as amended recites that, in response to user input, a creation breakpoint is set for a class defined in the object-oriented computer program. The setting of the creation breakpoint includes identifying a plurality of creators for the class and setting a plurality of breakpoints on the identified creators, where each of the plurality of breakpoints is

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associated with the creation breakpoint. The method also includes halting execution of the object-oriented computer program during debugging in response to hitting any of the plurality of breakpoints.

In rejecting claim 1, the Examiner relies on West, and specifically, the passages in West that deal with the concept of setting breakpoints on constructor methods in an object-oriented program. West, however, sets the breakpoints only for the purpose of enabling a line-by-line debugger to more effectively process an object-oriented program. The breakpoints set on constructor methods in West are used to suspend execution at points that are relevant to tracking state changes from an object-oriented perspective. A constructor method breakpoint, from this perspective, is used to enable the debugger to track the creation of a new object by the program being debugged. Of note, however, these breakpoints do not appear to halt execution from the standpoint of the user. The suspension of execution, updating of state information, and resumption of execution appear to be hidden from the user, and as such, Applicants submit that the constructor method breakpoints in West are not created "in response to user input" as required by claim 1.

The invention recited in claim 1 is directed to breakpoints that are specifically created or set "in response to user input". Furthermore, the Examiner will note that Applicants have clarified claim 1 to specify that each of the plurality of breakpoints is associated with a "creation breakpoint" that is set in response to user input, and that the identification of the plurality of creators and the setting of the plurality of breakpoints on the plurality of creators, are steps performed in connection with setting the creation breakpoint. Of note, claim 7 was canceled, and claim 8 amended to depend from claim 1, for consistency with the amendments to claim 1.

Claim 1 is directed, in part, to addressing a problem experienced by individuals attempting to debug an object-oriented program, where in order to request that a program be halted whenever an object instance of a particular class is created, the individual would

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be required to manually set breakpoints on every relevant constructor method for that class. This requirement can be unduly burdensome, particularly when a large number of constructor methods are defined, and furthermore, may introduce the possibility of human error if one of the constructor methods is missed. Furthermore, removing all of the breakpoints can also be burdensome, given that the breakpoints would need to be manually removed one at a time.

It is important to note, therefore, that the plurality of breakpoints set in claim 1 are not merely a group of unassociated breakpoints. Rather, these breakpoints are collectively associated with a distinct entity referred to as a creation breakpoint. By doing so, the breakpoints are able to be collectively managed. Furthermore, given the user-initiated aspect of a creation breakpoint as defined in claim 1, it is possible, for example, for a user to request that program execution be halted whenever it is detected that an object instance of a particular class has been created, regardless of which constructor method was used to create that object instance. Thus, the user is able to think of a user-set breakpoint more in terms of object-oriented programming concepts, rather than procedural based concepts.

West, on the other hand, does not disclose any entity that is conceptually analogous to a "creation breakpoint", much less such an entity that is set in response to user input. In West, the breakpoints set on constructor methods are not associated with any common entity, rather, they appear to be unassociated breakpoints set on individual methods. Furthermore, the breakpoints are set on constructor methods in West in connection with setting breakpoints on all methods for the purpose of tracking related status information for a program. Constructor methods, however, are set in West separately from other methods only for the purpose of enabling more efficient loading of a program into a debugger.

Specifically, as described in West at col. 10, lines 47-54 and col. 12, lines 37-42, when an program is loaded, initially breakpoints are only set on constructor methods, so

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that setting breakpoints on other methods can be deferred until specific objects are created. Presumably, by separating the breakpoint setting in this manner, the time required to initially load a program is reduced.

Of note, the constructor method breakpoints are set in West in connection with initially loading a program into a debugger (referred to in West as "constructor-based loading"); and not in response to user input. Moreover, it appears that the constructor method breakpoints are not associated with any separate entity that is analogous to a "creation breakpoint." As such, West does not disclose the concept of setting a plurality of breakpoints on identified creators, much less setting a creation breakpoint, specifically in response to user input. Claim 1 is therefore novel over West.

Claim 1 is also non-obvious over West as there is no suggestion in the reference, or elsewhere in the prior art, of the desirability of allowing a user to set a breakpoint on a class for the purpose of collectively managing a plurality of breakpoints set on multiple creators for that class. Given that West utilizes constructor method breakpoints for the purpose of internally tracking object-related status information, and does not even appear to return control to the user whenever any of such breakpoints are hit, Applicants submit that West does not provide the necessary motivation. Furthermore, the Examiner has provide no objective evidence of motivation elsewhere in the prior art. Accordingly, Applicants respectfully submit that claim 1 is also non-obvious over West. Reconsideration and allowance of claim 1, as well as of claims 2-6 and 8-13 which depend therefrom, are therefore respectfully requested.

Next with respect to independent claim 14, this claim generally recites a computer-implemented method of debugging an object-oriented computer program. The method includes tracking a number of object creations of a class defined in the object-oriented computer program during debugging, and halting execution of the object-oriented computer program in response to the number of object creations meeting a

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condition. Claim 14 has also been amended to clarify that the tracked number of object creations includes object creations resulting from multiple creators for the class.

In rejecting claim 14, the Examiner admits that West does not disclose halting execution of a program in response to the number of object creations meeting a condition. Instead, the Examiner relies on Applicant Admitted Prior Art (AAPA) (described at p. 2, lines 3-8 and p. 3, lines 1-8 and 20-22 of the Application) for allegedly disclosing this concept. (see the discussion of claim 10 at p. 6 of the Office Action).

However, the cited passages in the Application do not support the Examiner's arguments. Specifically, p. 2, lines 3-8 discloses only that, with respect to individual breakpoints, it is known to make such breakpoints conditional on being hit a specified period of time. The passages at p. 3, lines 1-8 and 20-22 refer to constructors, but do not discuss setting conditions on breakpoints. Presumably, the Examiner relies on these passages to assert that conditions may be associated with breakpoints set on constructors.

Claim 14, on the other hand, recites that the tracked number of object creations, which is used to halt execution when a particular condition is met, includes object creations resulting from multiple creators for a class. The fact that individual breakpoints could be set on constructor methods, and that those breakpoints could have conditions associated therewith to trigger the breakpoints only after a number of hits, still falls short of disclosing this concept.

The Examiner's attention is directed to p. 4, lines 7-13 of the Application, which discloses the drawbacks of precisely such a scenario. In particular, with conditions associated with individual breakpoints set on multiple constructor methods, a user would still not be able to halt execution after a specific number of object creations. As an example, suppose a user wanted to halt execution of a program after 10 objects of a particular class were created, where that class had three constructor methods A, B and C. Setting individual breakpoints, even with each having a condition specified therefor to trigger only after a certain number of hits, would not enable a user to be certain that the

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program would be halted after 10 objects were created, as during runtime, the number of creations resulting from each creator could be vastly different. For example, 10 objects could be created just from constructor method A, B, or C, or any combination thereof (e.g., A=3, B=3, C=4, or A=1, B=9, C=0, or A=0, B=5, C=5, etc.) In essence, it is the sum of the number of hits to the breakpoints set on the different constructors that is of interest to the user, a number that has conventionally never been tracked.

The invention of claim 14 therefore addresses this limitation of the prior art by tracking the number of object creations resulting from multiple creators for a class. Applicants respectfully submit that, as the Examiner has admitted, this concept is not disclosed in West. Furthermore, as noted above, falls short of AAPA disclosing this concept.

Moreover, Applicants submit that there is no evidence of any motivation in the art to modify West in the manner suggested by the Examiner. West does not suggest triggering a breakpoint after a predetermined number of object creations. Nor does AAPA, and furthermore, Applicants submit that reliance on the AAPA to provide evidence of motivation would necessarily rely on hindsight.

Applicants therefore respectfully submit that claim 14 is novel and non-obvious over the prior art of record. Reconsideration and allowance of claim 14, as well as of claims 15-22 which depend therefrom, are therefore respectfully requested.

Next, with respect to independent claims 23 and 38, each of these claims has been amended in a similar manner to independent claim 1. In addition, claim 28 has been canceled, and claim 29 amended to depend from claim 23, for consistency with the amendments made to claim 23. As with claim 1, each of claims 23 and 38 recite the concept of setting a creation breakpoint in response to user input, resulting in the setting of a plurality of associated breakpoints on a plurality of creators. As discussed above in connection with claim 1, this concept is not disclosed or suggested by West, and as such, claims 23 and 38 are novel and non-obvious over West. Reconsideration and allowance

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of claims 23 and 38, as well as of claims 24-27, 29-33, and 39 which depend therefrom, are therefore respectfully requested.

Next with respect to independent claims 34 and 40, each of these claims has been amended in a similar manner to claim 14, and now recite the concept of halting execution of an object-oriented computer program in response to a tracked number of object creations for a class meeting a condition, where the tracked number of object creations includes object creations resulting from multiple creators for the class. As discussed above in connection with claim 14, this concept is not disclosed or suggested by West or AAPA, and as such, these claims are patentable over the cited references for the same reasons as presented for claim 14. Reconsideration and allowance of claims 34 and 40, as well as of claims 35-37 which depend therefrom, are therefore respectfully requested.

In summary, Applicants respectfully submit that all pending claims are novel and non-obvious over the prior art of record. Reconsideration and allowance of all pending claims are therefore respectfully requested. If the Examiner has any questions regarding the foregoing, or which might otherwise further this case onto allowance, the Examiner may contact the undersigned at (513) 241-2324. Moreover, if any other charges or credits are necessary to complete this communication, please apply them to Deposit Account 23-3000.

Respectfully submitted,

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Date


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